CS310

Nondeterministic Finite Automata

Sections:1.2 page 47

September 12, 2008

Example (1.30)

- Accept string of at least length three that contains a 1 in the third from end

$$\Sigma = \{0, 1\}; \Sigma^* 1(0 \cup 1)(0 \cup 1)$$

What makes this difficult for a DFA?

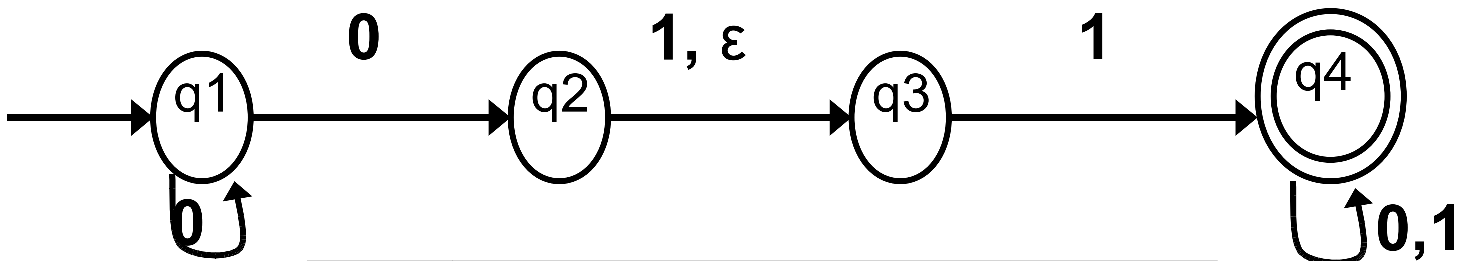
Equivalent DFA takes 8 states. Why 8?

Formal Definition of NFA

- 5 tuple (Q,Σ, δ , q_0,F)

$$\Sigma_{\varepsilon} = \Sigma \cup \{ e \}$$

$$\delta : Q \times \Sigma_{\varepsilon} \rightarrow P(Q)$$



	0	1	ε
q1			
q2			
q3			

Formal Definition of Computing for NFA

- Given a machine M= (Q, ∑ , δ,q_0, F) and a string $w=w_1w_2\ldots w_n$ over ∑, then M ***accepts*** w if there exists a sequence of states $r_0,r_1\ldots r_n$ in Q such that:
  - $r_0 = q_0$
  - $\delta\ (r_i, w_{i+1}) = r_{i+1}$,i=0,…,n-1
  - $r_n \in F$

Practice

- Construct a NFA with three states that recognizes {w | w ends with two 0s}

  $\Sigma = \{0,1\}$

Practice

- Construct a NFA with six states

  {w | w even # 0s OR exactly two 1s}

  $\Sigma = \{0,1\}$

Practice

- Construct a NFA with three states

  0*1*0*0

  $\Sigma = \{0,1\}$